

Curriculum vitae di Roberto Morandotti

Sottosettori ERC primari (max 3): *PE2_12 Optics, non-linear optics and nano-optics*, *PE2_13 Quantum optics and quantum information*, *PE2_14 Lasers, ultra-short lasers and laser physics*

PERSONAL DETAILS

Family name, First name: Morandotti, Roberto

Birthdate: 29/11/1967

Researcher unique identifier(s) (such as ORCID, Research ID, etc.): ORCID 0000-0001-7717-1519,

Google Scholar profile: <https://scholar.google.com/citations?hl=fr&user=0bCekgQAAAAJ>

URL for website: <https://inrs.ca/en/research/professors/roberto-morandotti/>,

<https://www.nonlinearphotonics.com/>

• Education and key qualifications

01/07/1999 PhD
Electric and Electronic Engineering / University of Glasgow, UK
Supervisor: Stewart Aitchison
1993 Master's in Physics / University of Genoa, Italy

• Current position(s)

2008 - Present Full Professor,
Institut national de la recherche scientifique - Centre Énergie Matériaux
Télécommunications (INRS-EMT) / Canada
2008 - Present Holder of the Canada Research Chair in Smart Photonics, renewed as Smart Programmable
Photonics

• Previous position(s)

2016 - 2019 Visiting Professor
Department of Laser Systems and Technologies / ITMO University, Russia
2015 - 2019 Visiting Professor
University of Electronic Science and Technology of China, China
2007 – 2008 Associate Professor, Tenure
INRS-EMT, Canada
2003 - 2007 Associate Professor, Tenure Track,
INRS-EMT, Canada
2002 - 2003 Postdoctoral Researcher
Electric and Electronic Engineering, University of Toronto, Canada
1992 - 2002 Postdoctoral Researcher
Physics of Complex Systems, Weizmann Institute of Science, Israel
1999 - 1999 Research Assistant,
Electric and Electronic Engineering, University of Glasgow, UK
1998 - 1999 Visiting Scientist
Physics of Complex Systems, Weizmann Institute of Science, Israel
1995 – 1996 Scientist, Research and Development,
Quality Control, Nuclear Enterprise Technologies Ltd, Edinburgh, UK
1993 – 1994 Public Sector Employee, Officer,
Lieutenant, Technical Corps, Italian Navy, Italy.

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

R. Morandotti (He/his) current research output, as reported by Google Scholar, includes approximately 67,000 citations and an h-index of 120, together with 362 refereed journal articles, 10 book chapters, 2 co-edited books, 251 invited talks, 24 postdeadline talks, 704 conference presentations, and 26 patents. These patents cover stable mode-locked lasers, high-dimensional quantum-state generation and control, active interferometer stabilization, nonlinear optical process optimization, terahertz generation and detection, real-time multidimensional THz imaging, and tunable ultrafast optical pulse generation.

Most significant peer-reviewed contributions

[1] Ferrera et al. (**including R. Morandotti**), “Low-power continuous-wave nonlinear optics in doped silica glass integrated waveguide structures,” *Nature Photonics* 2, 737, 2008, cited 887 times.

Significance: Established doped-silica integrated waveguides as a low-power CMOS-compatible platform for nonlinear optics.

[2] Razzari et al. (**including R. Morandotti**), “CMOS-compatible integrated optical hyper-parametric oscillator,” *Nature Photonics* 4, 41, 2010, cited 1,232 times.

Significance: Demonstrated a compact integrated optical oscillator, supporting chip-scale frequency-comb generation.

[3] Ferrera et al. (**including R. Morandotti**), “On-chip CMOS-compatible all-optical integrator,” *Nature Communications* 1, 29, 2010, cited 684 times. **Significance:** Showed an integrated all-optical signal-processing function for ultrafast optical computing.

[4] Pasquazi et al. (**including R. Morandotti**), “Sub-picosecond phase-sensitive optical pulse characterization on a chip,” *Nature Photonics* 5, 618, 2011, cited 517 times.

Significance: Enabled chip-based characterization of ultrafast optical pulses with sub-picosecond resolution.

[5] Moss et al. (**including R. Morandotti**), “New CMOS-compatible platforms based on silicon nitride and Hydex for nonlinear optics,” *Nature Photonics* 7, 597, 2013, cited 2,163 times.

Significance: Helped define silicon nitride and Hydex as leading CMOS-compatible nonlinear photonic platforms.

[6] Reimer et al. (**including R. Morandotti**), “Generation of multiphoton entangled quantum states by means of integrated frequency combs,” *Science* 351, 1176, 2016, cited 1,016 times.

Significance: Showed integrated frequency combs as scalable sources of multiphoton entangled quantum states.

[7] Kues et al. (**including R. Morandotti**), “On-chip generation of high-dimensional entangled quantum states and coherent control,” *Nature* 546, 622, 2017, cited 1,386 times.

Significance: Opened a route to high-dimensional quantum information processing on integrated photonic chips.

[8] Kues et al. (**including R. Morandotti**), “Quantum optical microcombs,” *Nature Photonics* 13, 170, 2019, cited 861 times.

Significance: Established optical microcombs as a key platform for quantum photonics and high-dimensional entanglement.

[9] Bao et al. (**including R. Morandotti**), “Laser cavity-soliton microcombs,” *Nature Photonics* 13, 384, 2019, cited 698 times.

Significance: Introduced a robust microcomb regime relevant to compact coherent light sources and precision photonics.

[10] Corcoran et al. (**including R. Morandotti**), “Ultra-dense optical data transmission over standard fibre with a single chip source,” *Nature Communications* 11, 2568, 2020, cited 791 times.

Significance: Demonstrated chip-scale microcomb sources for high-capacity optical fibre communications.

[11] Xu et al. (**including R. Morandotti**), “11 TOPS photonic convolutional accelerator for optical neural networks,” *Nature* 589, 44, 2021, cited 1,710 times.

Significance: Delivered a landmark photonic neural-network accelerator using microcomb parallelism.

[12] Rowley et al. (**including R. Morandotti**), “Self-emergence of robust solitons in a microcavity,” *Nature* 608, 303, 2022, cited 352 times.

Significance: Advanced robust soliton generation in microcavities for metrology and compact comb sources.

[13] Dong et al. (**including R. Morandotti**), “Single-shot ultrafast terahertz photography,” *Nature Communications* 14, 1704, 2023, cited 41 times.

Significance: Introduced a terahertz imaging method for capturing ultrafast scenes in a single shot.
[14] Mazoukh et al. (**including R. Morandotti**), “Genetic algorithm-enhanced microcomb state generation,” Communications Physics 7, 81, 2024, cited 112 times.
Significance: Connected nonlinear photonics with optimization methods to improve microcomb state control.
[15] Yu et al. (**including R. Morandotti**), “Quantum key distribution implemented with d-level time-bin entangled photons,” Nature Communications 16, 171, 2025, cited 135 times.
Significance: Demonstrated high-dimensional time-bin entanglement for quantum key distribution.
[16] Monika et al. (**including R. Morandotti**), “Quantum state processing through controllable synthetic temporal photonic lattices,” Nature Photonics 19, 95, 2025, cited 39 times.
Significance: Showed controllable synthetic temporal lattices as a platform for quantum state processing.
[17] Bai et al. (**including R. Morandotti**), “TOPS-speed complex-valued convolutional accelerator for feature extraction and inference,” Nature Communications 16, 292, 2025, cited 106 times.
Significance: Extended photonic AI toward complex-valued, high-throughput feature extraction and inference.
[18] Hu et al. (**including R. Morandotti**), “Topological orbital angular momentum extraction and twofold protection of vortex transport,” Nature Photonics 19, 162, 2025, cited 58 times.
Significance: Advanced topological photonics through protected transport and extraction of structured light.
[19] Corcoran et al. (**including R. Morandotti**), “Optical microcombs for ultrahigh-bandwidth communications,” Nature Photonics 19, 451, 2025, cited 109 times.
Significance: Consolidated optical microcombs as a core technology for scalable ultrahigh-bandwidth communications.
[20] Aadhi et al. (**including R. Morandotti**), “Scalable photonic reservoir computing for parallel machine learning tasks,” Nature Communications, 2025, cited 30 times.
Significance: Demonstrated wavelength-parallel photonic reservoir computing for scalable machine-learning signal processing.

Peer recognition

- Optica Max Born Award, 2026.
- Fellow of the Canadian Institute of Engineering, 2026.
- Fellow of the Canadian Academy of Engineering, 2026
- IEEE Photonics Society Quantum Electronics Award, 2025.
- Tier 1 Canada Research Chair in Smart Photonics, 2016.
- University of Quebec Award for Excellence in Research and Creation, 2024.
- Prix Planete INRS for excellence in mentoring, 2024, and for excellence in research achievements, 2023.
- Prix Acfas Urgel-Archambault for physical sciences, mathematics, computer science, and engineering, 2023.
- Prix du Québec Marie-Victorin, 2022.
- IEEE Fellow, 2021, and AAAS Fellow, 2020.
- NSERC Brockhouse Prize, 2020.
- NSERC Synergy Award for Innovation, 2019.
- Fellow of the Institute of Physics and Fellow of the American Physical Society, 2014.
- Fellow of the Royal Society of Canada, 2012, Fellow of SPIE, 2012, Fellow of OSA, 2011.
- NSERC E.W.R. Steacie Memorial Fellow, 2011.
- IEEE Distinguished Lecturer in Photonics, 2017-2018.

ADDITIONAL INFORMATION

Other contributions to the research community

- Leadership, funding, and research management: He has secured 140 grants, totalling over \$62 million as principal investigator or co-investigator. He is Director of AQUA, Advanced QUANTum applications via complex states in integrated and meta optics, co-principal investigator of Quantum Enhanced Sensing and Imaging, member of the Australian Research Council Centre of Excellence in Optical Microcombs for Breakthrough Science, and participant in the Canada-Europe HyperSpace project with the Fraunhofer Institute for Applied Optics and Precision Engineering. He also served as the INRS institutional leader in an

international Canada-Germany research training program on guided light in complex structures, and PI of several Canada-UK and Canada-Grance Initiatives on Quantum Technologies.

- Editorial roles and peer review: He is Chief Editor of Lights, MDPI, 2025 to 2027, and Chief Editor of Advanced Optical Technologies, Frontiers, from 2023 to 2027. He has served as Associate Editor for Advances in Nonlinear Optics, Research Letters in Optics, International Journal of Optics, and Advances in Physics: X, and as a member of the Editorial Board of APL Photonics.

He regularly reviews manuscripts for leading journals, including Nature, Science, Nature Photonics, Nature Physics, Nature Communications, Physical Review Letters, Optics Letters, Optics Express, and Laser & Photonics Reviews.

- Committees, evaluation and professional service: He has assessed research proposals for major agencies, including the European Research Council, Natural Sciences and Engineering Research Council of Canada, United States National Science Foundation, United Kingdom Engineering and Physical Sciences Research Council, Austrian Science Fund, United States-Israel Binational Science Foundation, Fonds de recherche du Québec, Qatar National Research Fund, New Zealand Ministry of Business, Innovation and Employment, Croatian Science Foundation, Israeli Science Foundation, and United States Army Research Office.

He has served on the Natural Sciences and Engineering Research Council of Canada Quantum Committee, the Expert Group Quantum Defence Canada, the Quantino selection committee for quantum start-ups, the Natural Sciences and Engineering Research Council of Canada McDonald Prize selection committee, the European Research Council Consolidator Grant selection committee, and the Natural Sciences and Engineering Research Council of Canada and Fonds de recherche du Québec NOVA selection committee.

- Training and mentoring: Since 2003, he has taught INRS courses, including Nouveaux Horizons en Photonique, Material Science, and directed lectures. He has trained over 220 highly qualified personnel, including undergraduate interns, master's and PhD students, postdoctoral fellows, and research associates. His trainees have received Vanier Canada Graduate Scholarships, Banting Postdoctoral Fellowships, Marie Skłodowska-Curie Fellowships, Mitacs Elevate Fellowships, Canada Graduate Scholarships, Postgraduate Scholarships, and 51 Natural Sciences and Engineering Research Council of Canada Undergraduate Student Research Awards. About 90% of alumni hold faculty positions or prestigious postdoctoral fellowships at leading institutions, including 6 who are/have been ERC fellows.

He helped establish the spin-off Ki3 Photonics, founded by one of his former postdoctoral fellows and a former PhD student, who now serve as CEO and CTO, respectively. The company was created to commercialize technologies conceived in his group and was accepted into the Creative Destruction Lab program.

- International training initiatives: He promoted an international PhD program between the University of Palermo (Italy) and INRS, with four PhD fellowships awarded in 2016 and four more in 2017.

- Technology transfer: He contributed to collaborations with Xanadu Quantum Technologies, PASQAL Canada, CMC Microsystems, Enablence, Few-cycle, SpectraCann, LioniX, LightSmyth Technologies, and Ki3 Photonics.

- Scientific community leadership: He has co-chaired bilateral photonics meetings, hosted industry workshops, and taken roles as general chair, program chair, subcommittee chair, session chair, and committee member in major photonics conferences, including the prestigious Conference on Lasers and Electro-Optics and Quantum Electronics and Laser Science Conference (CLEO), as well as other international meetings in optics, nonlinear photonics, terahertz science, and integrated photonics.

- Outreach and visibility: His work has been featured multiple times in Optics & Photonics News, Optics of the Year, and in international media outlets, including coverage of integrated quantum photonics, laser-guided discharges, optical microcombs, topological photonics, terahertz imaging, sixth-generation communication technologies, and optical artificial intelligence.

Career breaks, diverse career paths, and major life events

As Military Service was obligatory when he obtained his Laurea (equivalent to an M.Sc. Degree) back in 1993, he applied, was selected, and thus enrolled as an Officer in the Italian Navy, during the period 10/1993–12/1994. Subsequently, he worked as a Quality Control Physicist at Nuclear Enterprise Ltd. (NET), Edinburgh, Scotland, from 01/1995 to 01/1996. When he started his Ph.D., he was **28 years old, and achieved it in 1999, when he was 32**. Thus, he launched his scientific career in mid-1996 and became an independent research scientist at INRS in 2003.